

Claims

1. Gas chromatograph for the analysis of a sample, having a feed arrangement (3-6) for feeding the sample, an open tubular capillary column (2) for separating the components of the sample, temperature control means (8-15) for controlling the temperature of the column (2), and a detector (1) for detecting the separated components of the sample, wherein said column (2) comprises a bundle of open tubular capillaries, **characterized** in that said open tubular capillaries (16) have gas permeable walls comprising a polymer membrane (19).
2. Gas chromatograph according to claim 1, **characterized** in that it is a hand-held portable gas chromatograph.
3. Gas chromatograph according to claim 3 or 4, **characterized** in that said wall has an inner layer of a selectively gas permeable polymer membrane (19) and an outer layer of a porous polymer support (18).
4. Gas chromatograph according to claim 1, 2 or 3, **characterized** in that said bundle has between 10 and 10000 pieces of open tubular capillaries (16).
5. Gas chromatograph according to any one of the preceding claims, **characterized** in that said open tubular capillaries (16) have a length of 10 to 100 cm and an inner diameter of 10 to 1000 μm .
6. Gas chromatograph according to any one of the preceding claims, **characterized** in that said bundle contains 100 to 4000 pieces of said open tubular capillaries (16).
7. Gas chromatograph according to any one of the preceding claims, **characterized** in that the inner diameter of the tubular capillaries (16) is from 50 to 1000 μm .
8. Gas chromatograph according to any preceding claim, **characterized** in that said open tubular capillaries (16) have open space between them.
9. Gas chromatograph according to any one of the preceding claims, **characterized** in that said column (2) has a cover (10, 14) surrounding said bundle.
10. Gas chromatograph according to claim 8 or 9, **characterized** in that said temperature control means (8-15) include a heating medium (9) arranged to flow (11) through said open space between said capillaries (16).

11. Gas chromatograph according to claim 10, **characterized** in that said temperature control means (8-15) include said cover (14) which is made of heat insulating material and has inlet and outlet openings (8) for allowing said heating medium (9) to flow through said open space between said capillaries (16).
- 5 12. Gas chromatograph according to any one of the preceding claims, **characterized** in that said temperature control means (8-15) include a thermostat heater (13) for controlling the temperature of said heating medium (9).
13. Gas chromatograph according to claim 12, **characterized** in that said temperature control means (8-15) include a pump (12) and a hose or tube (15) for
10 pumping and conveying said heating medium (9) between said thermostat heater (13) and the open space between said capillaries (16).
14. Gas chromatograph according to any one of the preceding claims, **characterized** in that said feed arrangement (3-6) comprises a filter (3) for absorbing vapour from the sample before it enters the column (2).
- 15 15. Gas chromatograph according to any one of the preceding claims, **characterized** in that said feed arrangement (3-6) comprises a gas inlet (5) for letting the sample into said column (2).
16. Gas chromatograph according to claim 14 or 15, **characterized** in that said feed arrangement (3-6) comprises a valve (4) for directing the sample to said
20 column (2) alternatively directly or through said filter (3).
17. Gas chromatograph according to any one of the preceding claims, **characterized** in that said feed arrangement (3-6) comprises a valve (6) for directing the sample through said column (2) or alternatively directly to said detector (1).
- 25 18. Gas chromatograph according to any one of the preceding claims, **characterized** in that said detector (1) is an ion mobility spectrometer IMS.
19. Gas chromatograph according to claim 18, **characterized** in that the IMS is a hyphenated multisensor IMS designed for direct flow-through of the sample.
20. Gas chromatograph according to claim 19, **characterized** in that said detector
30 (1) employs semiconductor sensors, electroacoustic gas sensors or sensor arrays thereof, or humidity and temperature sensors, or a combination of any of those, in which case at least one sensor is said IMS.

21. Gas chromatograph according to any of the preceding claims, **characterized** in that said bundle of open tubular capillaries is of the type used in an industrial membrane dryer.
22. Gas chromatograph according to any preceding claims, **characterized** in that
5 said gas chromatograph is a portable and/or hand-held gas analyzer.